

RF 128.1123USN 11/30/04

- 3 -

In the claims:

Please amend the claims as shown below:

- 5 1. (Currently amended) A method for the continuous cooking of wood raw material for the production of cellulose pulp, comprising:  
~~where the feeding a wood raw material and the a cooking fluid are fed to the a top of a continuous digester;~~
- 10 ~~and where establishing a cooking temperature of 130-170° is established in the cooking vessel digester while the wood raw material experiences experiencing a retention time of at least 90 minutes at this the cooking temperature;~~  
~~, and where the wood raw material sinks sinking continuously~~
- 15 ~~through the digester from the top down to its a bottom of the digester in order to be finally expelled expelling the wood raw material from the bottom of the digester;~~  
~~, and at least two withdrawal positions for cooking fluid are arranged in the digester at different heights, at least one~~
- 20 ~~first lower and one second upper withdrawal position in the digester, arranging a first withdrawal position in the digester for the cooking fluid and arranging a second withdrawal position for the cooking fluid, the second withdrawal position being above the first withdrawal~~
- 25 ~~position;~~  
~~where the withdrawing cooking fluid at the first and second first and the second withdrawal positions, is withdrawn after the wood raw material has had a retention time in the digester that differs by at least 10 minutes, and preferably~~
- 30 ~~by at least 20 minutes, and where the wood raw material having experienced a first retention time in the digester at the first withdrawal position and a second retention time in the digester at the second withdrawal position, the first~~

RF 128.1123USN 11/30/04

- 4 -

retention time being at least 10 minutes different from the second retention time;

establishing a zone of a countercurrent or a concurrent flow  
~~or of concurrent flow is established~~ in the digester between

5 the first and second withdrawal positions;

~~characterised in that~~

~~the determining a differential pressure ( $\Delta P$ ) between the second upper and the lower first withdrawal positions; is~~

~~determined ( $\Delta P = P_{upper} - P_{lower}$ )~~

10 and when a cooking zone of concurrent flow has been established between the first and second withdrawal positions and when the differential pressure ( $\Delta P$ ) exceeds a pre-determined level, opening a first connection between these  
the first and second withdrawal positions; and opens,

15 and when a cooking zone of countercurrent flow has been established between the first and second withdrawal positions and when the differential pressure ( $\Delta P$ ) falls below a pre-determined level, opening a first connection between these  
the first and second withdrawal positions opens.

20

2. (Currently amended) The method according to claim 1 wherein the first withdrawal position is constituted by a first withdrawal strainer that is located at the bottom of the digester in the a wall section of the digester, and

25 wherein the second withdrawal position is constituted by a second withdrawal strainer that is located above the first withdrawal strainer at a sufficient distance to ensure that  
ensures that the wood raw material at the second withdrawal strainer has had a the first retention time that is at least  
30 10 minutes, preferably at least 20 minutes, shorter in the digester compared to the first retention time of the wood raw material at the first withdrawal strainer and where the a  
physical distance between the first and second withdrawal  
strainers is at least 2 meters metres, and preferably at

RF 128.1123USN 11/30/04

- 5 -

~~least 5 metres,~~ and wherein the digester has a third withdrawal position above the second withdrawal position ~~where so that~~ cooking fluid at the third withdrawal position is withdrawn after the wood raw material has had a retention time in the digester that is shorter and differs relative to the second withdrawal position by at least 10 minutes, and ~~preferably by at least 20 minutes,~~ and wherein a zone of concurrent flow or countercurrent flow is established in the digester between the second and the third withdrawal positions, ~~characterised in that the~~

a differential pressure ( $\Delta P$ ) between the second and the third withdrawal positions is determined, and when a cooking zone of concurrent flow has been established between the second and the third withdrawal positions and when the differential pressure ( $\Delta P$ ) between the second and the third withdrawal positions exceeds a pre-determined level, a first connection between the second and the third withdrawal positions opens, and when a cooking zone of countercurrent flow has been established between the second and the third withdrawal positions and when the differential pressure ( $\Delta P$ ) between the second and the third withdrawal positions falls below a pre-determined level, a second connection between the second and the third withdrawal positions opens.

3. (Currently amended) The method according to claim 2 wherein the digester has a fourth withdrawal position ~~where the so that~~ cooking fluid at ~~this the~~ fourth withdrawal position is withdrawn after the wood raw material has had a retention time in the digester that differs relative to that at the third withdrawal position by at least 10 minutes, and ~~preferably by at least 20 minutes,~~ and wherein a zone of countercurrent flow of concurrent flow is established in the digester between the third and the fourth withdrawal positions, ~~characterised in that the a~~

RF 128.1123USN 11/30/04

- 6 -

differential pressure ( $\Delta P$ ) between the third and the fourth withdrawal positions is determined, and when a cooking zone of concurrent flow has been established between the third and the fourth withdrawal positions and when the differential pressure ( $\Delta P$ ) between the third and the fourth withdrawal positions exceeds a pre-determined level, a third connection between the third and the fourth withdrawal positions opens, and when a cooking zone of countercurrent flow has been established between the third and the fourth withdrawal positions and when the differential pressure ( $\Delta P$ ) between the third and the fourth withdrawal positions falls below a third pre-determined level, a fourth connection between the third and the fourth withdrawal positions opens.

4. (Currently amended) The method according to claim 3 wherein the digester has a fifth withdrawal position ~~where the~~ so that cooking fluid at this fifth withdrawal position is withdrawn after the wood raw material has had a retention time in the digester that differs relative to that at the fourth withdrawal position by at least 10 minutes, and ~~preferably at least 20 minutes,~~ and where a cooking zone of countercurrent flow or concurrent flow is established in the digester between the fourth and fifth withdrawal positions, ~~characterised in that the~~ a differential pressure between the fourth and the fifth withdrawal positions is determined, and when a cooking zone of concurrent flow has been established between the fourth and the fifth withdrawal positions and when the differential pressure ( $\Delta P$ ) between the fourth and the fifth withdrawal positions exceeds a pre-determined fourth level, a fifth connection between the fourth and the fifth withdrawal positions opens, and when a cooking zone of countercurrent flow has been established between the fourth and the fifth withdrawal positions and

RF 128.1123USN 11/30/04

- 7 -

when the differential pressure ( $\Delta P$ ) between the fourth and the fifth withdrawal positions falls below a fourth pre-determined level, a sixth connection between the fourth and the fifth withdrawal positions opens.

5

5. (Currently amended) The method according to ~~any one of the preceding claims characterised in that~~ claim 1 wherein the first connection opens such that the a flow in the first connection between adjacent the first and second  
10 withdrawal positions becomes parallel to a flow of cooking fluid established in the digester through ~~the a~~ a column of chips between the ~~relevant~~ first and second withdrawal strainers.

15

6. (Currently amended) The method according to claim 1 wherein ~~any one of the preceding claims in which~~ washing fluid is added at the bottom of the digester through a ~~pressurised~~ pressurized washing fluid line, ~~characterised in that the a~~ differential pressure between the  
20 washing fluid line and the first withdrawal position ~~that is arranged at the bottom of the digester~~ is determined, and when ~~this~~ the differential pressure between the washing fluid and the first withdrawal position exceeds a pre-determined  
25 sixth level, a washing fluid line connection opens between the washing fluid line and ~~this~~ the first withdrawal position.

7. (Currently amended) The method according to ~~any one of the preceding claims in which~~ claim 1 wherein wood raw material  
30 and cooking fluid are added at the top of the digester during the withdrawal of cooking fluid at the top of the digester in a top strainer in direct connection with the top of the digester, and wherein the top strainer withdraws cooking fluid from the wood raw material before ~~this~~ the wood raw  
35 material has experienced any significant retention time in

RF 128.1123USN 11/30/04

- 8 -

the digester, for the cooking fluid is returned to the input system of the digester through a return line, ~~characterised in that the~~ a differential pressure is determined between the return line and ~~the~~ a withdrawal position that is arranged at the top of the digester, ~~while remaining and below the top strainer, is determined,~~ and when ~~this~~ the differential pressure exceeds a pre-determined seventh level, a return line connection between the return line and ~~this the~~ the withdrawal position arranged at the top of the digester ~~is opened~~opens.

8. (Currently amended) The method according to ~~any one of the preceding claims characterised in that the~~ claim 1 wherein differential pressures between all withdrawal positions from the bottom of the digester up to ~~the~~ an uppermost withdrawal position at which cooking fluid is withdrawn in order to be led away to ~~the~~ a recovery process, ~~possibly via its use in black liquor impregnation,~~ are determined and when the differential pressure between any of ~~these~~ adjacent withdrawal positions exceeds pre-determined levels when a cooking zone of concurrent flow has been established between the withdrawal positions or falls below pre-determined levels when a cooking zone of countercurrent flow has been established between the withdrawal positions, connections are opened between the ~~relevant~~ adjacent withdrawal positions.

9. (Currently amended) The method according to ~~any one of the preceding claims characterised in that~~ claim 1 wherein ~~the~~ differential pressures between all withdrawal positions in the ~~complete~~ digester at which cooking fluid is withdrawn are determined and when the differential pressure between any of ~~these~~ adjacent withdrawal positions exceeds pre-determined levels, connections are opened between the ~~relevant~~ adjacent withdrawal positions.

RF 128.112308N 11/30/04

- 9 -

10. (Currently amended) The method according to ~~any one of the preceding claims characterised in that claim 1 wherein the withdrawal position may be a cooking flow in~~  
5 ~~which cooking fluid is withdrawn and conditioned in an external treatment before being returned to the digester at the same level as the relevant withdrawal position, where the conditioning of the cooking fluid involves at least one of: heating, addition of cooking chemicals, preferably alkali, and withdrawal of consumed cooking fluid from the digester to a recovery process, possibly via the use of the consumed cooking fluid in a pre-impregnation stage.~~

11. (Currently amended) A continuous digester for the cooking  
15 of wood raw material for the production of cellulose pulp, comprising:  
a continuous digester having where the a wood raw material and the a cooking fluid are fed into the digester (CIN) at the a top of a the continuous digester;  
20 the digester having and where a cooking temperature of 130-170° is established in the a cooking vessel;  
retention means for providing while the wood raw material obtains with a retention time of at least 90 minutes at the this cooking temperature;  
25 , and where sinking means for permitting the wood raw material to sinks continuously through the digester from the top down to its a bottom of the digester in order to be and finally discharging the wood raw material output (C<sub>out</sub>) from the bottom of the digester;  
30 , and the digester having a first withdrawal position and a second withdrawal position at least two withdrawal positions (11A-11E) for cooking fluid, the first and second withdrawal positions being are arranged in the digester at different heights; , in the form of a lower and a second upper

RF 128.1123U9N 11/30/04

- 10 -

~~withdrawal position in the digester, where the cooking fluid at these withdrawal positions is withdrawn from the digester through having a strainer arranged in the a wall of the digester and being in operative engagement with~~  
5 ~~onwards via a withdrawal line;~~  
~~(12A-12E), where withdrawal means for withdrawing the cooking fluid in the first and the second withdrawal positions; is withdrawn~~  
~~retention means for providing the wood raw material with a~~  
10 ~~first retention time at the first withdrawal position and a second retention time at the second withdrawal position, the first retention time being at least 10 minutes different from the second retention time; after the wood raw material has had a retention time in the digester that differs by at least~~  
15 ~~10 minutes, and preferably by at least 20 minutes, and where the digester having a zone of a countercurrent flow or of a concurrent flow is established in the digester between the first and second withdrawal positions; characteris~~  
~~ed in that~~  
20 ~~a regulator valve (18A-18E) is arranged in a shunt line (17A-17E) extending between the a first withdrawal line at the first withdrawal position and a second withdrawal line at the second withdrawal positions;~~  
~~, which the regulator valve is being in operative engagement~~  
25 ~~with and controlled by a differential pressure gauge (PC) that is arranged to determine not only the for determining a pressure in the first withdrawal line at the first lower withdrawal position, but also the a pressure in the second withdrawal line at the second upper withdrawal position;~~  
30 ~~means for determining and determine a differential pressure as a difference in pressure between the upper and the lower first and second withdrawal positions;~~  
~~and that, depending on an established the digester having a cooking zone of a concurrent flow and a countercurrent flow~~  
35 ~~between the upper and the lower first and second withdrawal~~



RF 126.112308N 11/30/04

- 11 -

~~positions; and the exceeding of a pre-determined threshold value for the differential pressure, opens the regulator valve, or on the establishment of a cooking zone of countercurrent flow between the upper and the lower withdrawal position and the pressure falling below a pre-determined threshold value of the differential pressure opens the regulator valve.~~

means for opening the regulator valve when the concurrent flow is established and when the differential pressure

10 exceeds a predetermined threshold value; and

means for opening the regulator valve when the countercurrent flow is established and when the differential pressure falls below a predetermined threshold value.

15 12. (Currently amended) The continuous digester according to claim 11 wherein the first withdrawal position is constituted by a first withdrawal strainer ~~(11E)~~ that is located at the bottom of the digester in the a wall section of the digester, and where the second withdrawal position is constituted by a

20 second withdrawal strainer ~~(11D)~~ that is located above the first withdrawal strainer at a distance that ensures that the wood raw material has had a second retention time that is at least 10 minutes, ~~preferably at least 20 minutes,~~ shorter

25 than a first retention time at the first withdrawal position in the digester, and wherein the a physical distance between the first and second withdrawal strainers is at least 2 metersmetres, and ~~preferably at least 5 metres,~~ and wherein

30 the digester has a third withdrawal position ~~(11C)~~ above the second withdrawal position where cooking fluid at the third withdrawal position is withdrawn after the wood raw material has had a third retention time in the digester that is

35 shorter and differs relative to the second retention time of the second withdrawal position by at least 10 minutes, and ~~preferably by at least 20 minutes,~~ and wherein a cooking zone of a concurrent flow or a countercurrent flow is established

RF 128.1123USN 11/30/04

- 12 -

in the digester between the second and the third withdrawal positions; ~~characterised in that~~  
a regulator valve (18D) is arranged in a shunt line (17D) between the withdrawal lines (12D and 12C) of the second and  
5 third withdrawal positions, ~~which the~~ regulator valve is ~~being~~ controlled by a differential pressure gauge (PC) ~~that~~ is arranged to determine ~~not only the a~~ pressure in the withdrawal line (12C) at the second withdrawal position, ~~but also the and a~~ pressure in the withdrawal line (12D) at the  
10 third withdrawal position and to determine a difference in pressure between the third and the second withdrawal positions, and means for opening the regulator valve.

~~and that, depending on an established cooking zone of concurrent flow between the third and the second withdrawal positions and the exceeding of a pre-determined threshold value for the differential pressure, opens the regulator valve (18D), or on the establishment of a cooking zone of countercurrent flow between the third and the second withdrawal position and the pressure falling below a pre-~~  
15 ~~determined threshold value of the differential pressure opens the regulator valve.~~

13. (Currently amended) The continuous digester according to claim 12 wherein the digester has a fourth withdrawal  
25 position (11B) ~~where~~ so that the cooking fluid is drawn off at ~~this the~~ fourth withdrawal position after the wood raw material has had a fourth retention time in the digester that is at least 10 minutes, ~~preferably at least 20 minutes,~~ shorter relative to that of the third retention time at the  
30 third withdrawal position, and the digester has where a cooking zone of a countercurrent flow or a concurrent flow is established in the digester between the third and the fourth withdrawal positions, ~~characterised in that~~  
a regulator valve (18C) is arranged in a shunt line (17C) between the withdrawal lines (12C and 12D) of the third and  
35

RF 128.1123USN 11/30/04

- 13 -

fourth withdrawal positions, ~~which the~~ regulator valve ~~is~~  
being controlled by a differential pressure gauge (PC) that  
is arranged to determine ~~not only the a~~ pressure in the  
withdrawal line (12D) at the third withdrawal position, ~~but~~  
5 ~~also the and a~~ pressure in the withdrawal line (12C) at the  
fourth withdrawal position and, ~~depending on the exceeding~~  
~~of a pre-determined threshold value for the differential~~  
~~pressure, opens the regulator valve (18C).~~  
means for opening the regulator valve.

10

14. (Currently amended) The continuous digester according to  
claim 13 wherein the digester has a fifth withdrawal position  
(11A) ~~where so that~~ the cooking fluid is drawn off at ~~this~~  
the fifth withdrawal position after the wood raw material has  
15 had a fifth retention time in the digester that differs by at  
least 10 minutes, ~~preferably at least 20 minutes,~~ relative to  
that of the fourth retention time at the fourth withdrawal  
position, and wherein the digester has a cooking zone of a  
countercurrent flow or a concurrent flow ~~is~~ established in  
20 the digester between the fourth and the fifth withdrawal  
positions, ~~characterised in that~~ a regulator  
valve (18B) is arranged in a shunt line (17B) between the  
withdrawal lines (12B and 12A) of the fourth and fifth  
withdrawal positions, ~~which the~~ regulator valve ~~is being~~  
25 controlled by a differential pressure gauge (PC) that is  
arranged to determine ~~not only the a~~ pressure in the  
withdrawal line (12B) of the fourth withdrawal position, ~~but~~  
~~also the and a~~ pressure in the withdrawal line (12A) of the  
fifth withdrawal position, and, ~~depending on the exceeding of~~  
30 ~~a pre-determined threshold value for the differential~~  
~~pressure, opens the regulator valve (18B)~~ means for opening  
the regulator valve.

35

15. (Currently amended) The continuous digester according to  
~~any one of the preceding claims 11-14 in which~~ claim 11

RF 128.112305M 11/30/04

- 14 -

wherein the digester has ~~washing fluid is added at the bottom~~  
~~of the digester through pressurised pressurized~~ nozzles (6A-  
6C) ~~via connected to a pressurised pressurized~~ washing fluid  
line (WL/6); ~~, characterised in that~~ a regulator  
5 valve (18F) is arranged in a shunt line (17F) between the  
withdrawal line (12E) for the first withdrawal position at  
the bottom of the digester and the washing fluid line,  
(WL/6), ~~which the~~ regulator valve is being controlled by a  
differential pressure gauge (PC) arranged to determine not  
10 only the pressure in the washing fluid line (WL/6) ~~but also~~  
and a the pressure in the withdrawal line (12E) for the  
withdrawal position at the bottom of the digester and,  
~~depending on the exceeding of a pre-determined threshold~~  
~~value for the differential pressure, to open the regulator~~  
15 ~~valve (18F).~~ means for opening the regulator valve.

16. (Currently amended) The continuous digester according to  
~~any one of the preceding claims 11-15 in which claim 11~~  
wherein wood raw material and cooking fluid are added (C<sub>m</sub>) at  
20 the top of the digester during the withdrawal of cooking  
fluid at the top of the digester in a top strainer (4) in  
direct connection with the top of the digester and wherein  
the top strainer (4) withdraws cooking fluid from the wood  
raw material before ~~this~~ the wood raw material has  
25 experienced any significant retention time in the digester,  
for return to the input system (1) of the digester through a  
return line (3), ~~characterised in that~~ a  
regulator valve (18A) is arranged in a shunt line (17A)  
between the return line (3) and the withdrawal line (12A) at  
30 the withdrawal position (11A) that is arranged at the top of  
the digester, ~~while remaining and~~ below the top strainer,  
(4), ~~which~~ regulator valve is controlled by a differential  
pressure gauge (PC) that is arranged to determine not only  
~~the a~~ pressure in the return line (3) ~~but also the a~~ pressure  
35 in the withdrawal line (12A) at the withdrawal position (11A)

RF 128.112308N 11/30/04

- 15 -

that is arranged at the top of the digester, ~~while remaining~~  
~~and below the top strainer and means for opening the~~  
~~regulator valve. (4), and, depending of the exceeding of a~~  
~~pre-determined threshold of the differential pressure level,~~  
5 ~~opens the regulator valve (18A).~~

17. (Currently amended) The continuous digester according to  
~~any one of the preceding claims 11-16, characteris~~  
~~ed in that claim 11 wherein regulator valves (18D, 18E) are~~  
10 ~~arranged in shunt lines (17D, 17E) connected between all~~  
~~adjacent withdrawal positions (11C, 11E) from the a bottom of~~  
~~the digester up to the an uppermost withdrawal position (11C)~~  
~~at which cooking fluid is withdrawn in order to be led away~~  
~~to the recovery process (REC), possibly via the use of the~~  
15 ~~withdrawn cooking fluid in black liquor impregnation, wherein~~  
~~each one of these regulator valves is controlled by a~~  
~~differential pressure gauge that determines the a pressure in~~  
~~the relevant withdrawal lines at the adjacent withdrawal~~  
~~positions and means for opening the regulator valves. that,~~  
20 ~~depending on either the exceeding of a pre-determined level~~  
~~for the differential pressure when a cooking zone of~~  
~~concurrent flow has been established between the withdrawal~~  
~~positions or the falling below a pre-determined level of the~~  
~~differential pressure when a cooking zone of countercurrent~~  
25 ~~flow has been established between the withdrawal positions,~~  
~~opens the relevant regulator valve.~~

18. (Currently amended) The continuous digester according to  
~~any one of the preceding claims 11-17, characteris~~  
30 ~~ed in that claim 11 wherein a shunt line (17B-17E) is~~  
~~located between each withdrawal position (11A-11E) throughout~~  
~~the digester between the withdrawal line (12A-12E) of each~~  
~~adjacent withdrawal position, and that a regulator valve (18B~~  
~~-18E) is located in each shunt line, controlled by a~~  
35 ~~differential pressure gauge (PG) that determines the a~~

RF 128.1123USN 11/30/04

- 16 -

pressure in the ~~relevant~~ withdrawal lines at the adjacent withdrawal positions and means for opening relevant regulator valves. that, depending on either the exceeding or the falling below of a pre-determined threshold level for the differential pressure, opens the relevant regulator valve.

19. (Currently amended) The continuous digester according to ~~any one of the preceding claims 11-18, characteris~~  
~~e-d in that claim 11 wherein the digester has the withdrawal~~  
~~position may be a cooking flow in which cooking fluid is~~  
~~withdrawn through a cooking strainer arranged in the a wall~~  
~~of the digester, and conditioned in the digester has an~~  
~~external treatment for conditioning a cooking fluid, before~~  
~~its return to the digester via the digester has central pipes~~  
~~(13A, 13B, 13E) defined therein at the a same level as the~~  
~~relevant withdrawal positions, (11A, 11B and 11E), where the~~  
~~conditioning of the cooking fluid involves at least one of:~~  
~~heating (16A, 16B, 16E); addition of cooking chemicals (ADD),~~  
~~preferably alkali; and withdrawal (REC) of consumed cooking~~  
~~fluid from the digester to a recovery process, possibly via~~  
~~the use of the consumed cooking fluid in a pre-impregnation~~  
~~stage of the wood raw material. the digester has a heater for~~  
~~heating the cooking fluid and a recovery processing unit in~~  
~~operative engagement with the digester.~~

20. (Currently amended) The continuous digester according to claim 19, ~~characteris~~  
~~e-d in that wherein a the~~  
~~shunt line is arranged connected between the an adjacent~~  
~~withdrawal line and, when viewed from the point of view of~~  
~~the direction of flow of the cooking flow, before a~~  
~~circulatory pump (15A-15E) arranged in the digester relevant~~  
~~cooking flow.~~